NCDA&CS

2021 Annual Progress Report (Crop Year 2020) on the Neuse Agricultural Rule (15 A NCAC 2B.0712)

A Report to the Division of Water Resources from the Neuse Basin Oversight Committee: Crop Year 2020

Date approved by Neuse Basin Oversight Committee: October 4, 2021
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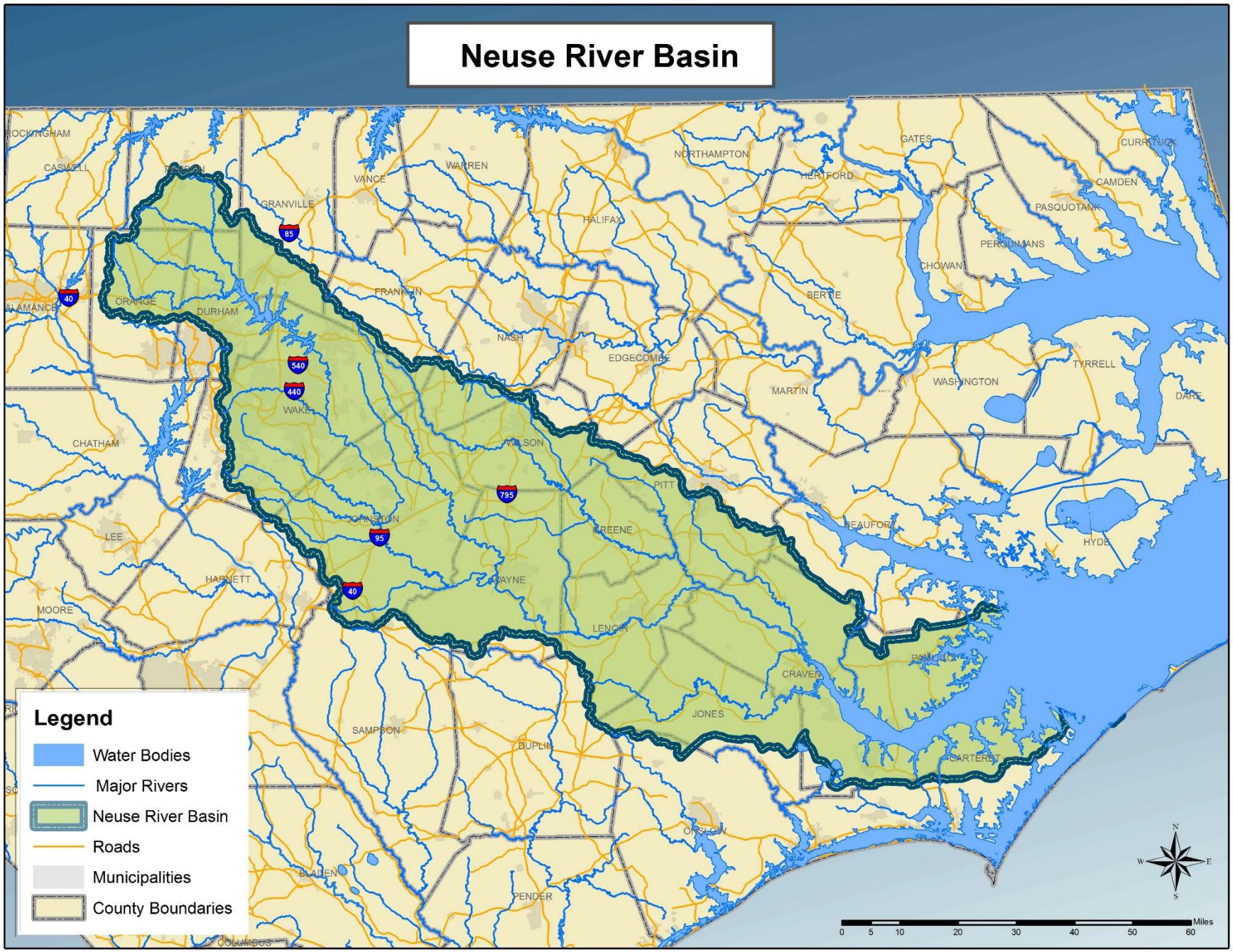
Neuse River Basin
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CASWELL
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GRANVILLE
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Summary

The Neuse Basin Oversight Committee (BOC) received and approved crop year (CY[1]) 2020 annual reports estimating the progress from the seventeen Local Advisory Committees (LACs) operating under the Neuse Agriculture rule as part of the Neuse Basin Nutrient Management Strategy. This report demonstrates agriculture's ongoing collective compliance with the Neuse Agriculture Rule and estimates producer progress in decreasing nutrients. In CY2020, agriculture collectively achieved an estimated 48% reduction in nitrogen loss from agricultural lands compared to the 1991-1995 baseline, continuing to exceed the rule-mandated 30% reduction. Fifteen of the seventeen LACs exceeded the 30% reduction goal established by the BOC. The main reason for the greater nitrogen reduction in these counties is cropping shifts to crops with lower nitrogen demands and application rates.

Rule Requirements and Compliance History

Neuse Nutrient Sensitive Waters (NSW) Strategy

The Environmental Management Commission (EMC) adopted the Neuse nutrient strategy in December, 1997. The NSW strategy goal was to reduce the average annual load of nitrogen delivered to the Neuse River Estuary by 2003 from both point and non-point source pollution by a minimum of 30% of the average annual load from the baseline period (1991-1995). Mandatory nutrient controls were applied to address non-point source pollution in agriculture, urban stormwater, nutrient management, and riparian buffer protection. The overall 30% nitrogen loading reduction target for the Neuse River Estuary has not yet been reached.

Effective December 1997, the rule provides for a collective strategy for farmers to meet the 30% nitrogen loss reductions within five years. A BOC and seventeen LACs were established to implement the Neuse Agriculture rule and to assist farmers with complying with the rule.

All seventeen Local Advisory Committees (LACs) met as required in 2021. The LACs submitted their first annual report to the BOC in May 2002. That report estimated a collective 38% reduction in nitrogen loss with 12 of the 17 LACs exceeding 30% individually. In 2003, all LACs achieved their BOC recommended reduction goal. All counties are currently meeting their goal with the exception of Pamlico County, which reported an 11% reduction, and Carteret County, which reported a 25% reduction. Division of Soil and Water Conservation staff uses input from the LACs to calculate their annual reductions using the Nitrogen Loss Estimation Worksheet (NLEW). Adjustments are made to reflect the most up-to-date scientific research. These revisions lead to adjustments in both individual LAC and basinwide nitrogen loss reduction rates.

[1] The 2020 crop year began in October 2019 and ended in September 2020.

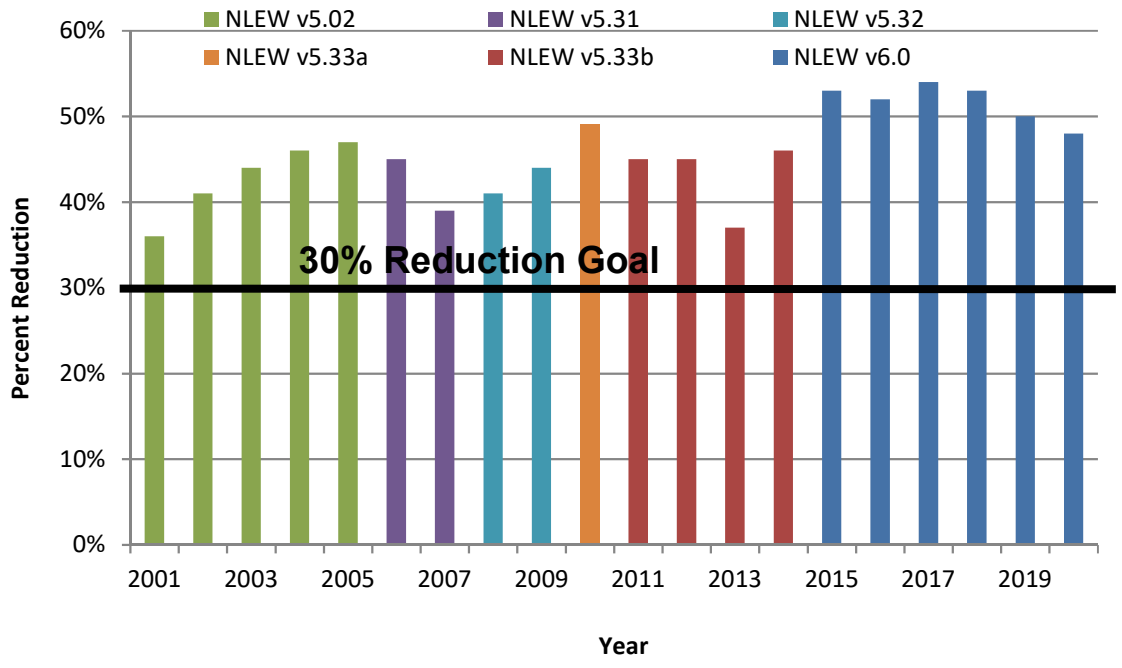
Scope of Report and Methodology

The estimates provided in this report represent whole-county scale calculations of nitrogen loss from cropland agriculture adjusted for acreage in the basin. These estimates were made by NC Division of Soil and Water Conservation (DSWC) staff using the 'aggregate' version of the Nitrogen Loss Estimation Worksheet, or NLEW, an accounting tool developed to meet the specifications of the Neuse Rule and approved by the EMC. The development team included interagency technical representatives of the NC Division of Water Resources (DWR), NC DSWC and USDA-Natural Resources Conservation Service (NRCS) and was led by NC State University Soil Science Department faculty. The NLEW captures application of both inorganic and animal waste sources of fertilizer to cropland. It does not capture the effects of nitrogen applied to pastureland and NLEW is an "edge-of-management unit" accounting tool; it estimates changes in nitrogen loss from croplands, but does not estimate changes in nitrogen loading to surface waters.

Annual Estimates of Nitrogen Loss and the Effect of NLEW Refinements

The NLEW software is periodically revised to incorporate new knowledge gained through research and improvements to data. These changes have incorporated the best available data, but changes to NLEW must be considered when comparing nitrogen loss reduction in different versions of NLEW. Further updates in soil management units are expected as NRCS produces updated electronic soils data. The small changes in soil management units are unlikely to produce significant effects on estimates of nitrogen loss reductions. Figure 1 represents the annual percent nitrogen loss reduction from the baseline for 2001 to 2020.

Figure 1. Collective Nitrogen Loss Reduction Percent 2001 to 2020 Based on NLEW, Neuse River Basin.



The first NLEW reports were run in 2001, and agriculture has continued to exceed its collective 30% nitrogen reduction goal since that time. The first NLEW revision (v5.31) marked a significant decrease in the nitrogen reduction efficiencies of buffers based on the best available research information, so baseline and CY2005 were re-calculated, and soil management units were revised. The second (v5.32) and third (v5.33a) revisions were minor updates of soil mapping units. In April of 2011 the NLEW Committee established further reductions (v5.33b) in nitrogen removal efficiencies for buffers based on additional research. In 2016 NLEW software was updated (v6.0) from outdated software and transferred to a web-based platform on NCDA&CS servers. Revised realistic yield and nitrogen use efficiency data from NCSU were incorporated, and some minor calculation errors were corrected for corn, sweet potatoes, and sweet corn. Table 1 lists the changes in buffer nitrogen reduction efficiencies over time.

Table 1. Changes in Buffer Width Options and Nitrogen Reduction Efficiencies in NLEW

Buffer Width	NLEW v5.02 % N Reduction 2001-2005	NLEW v5.31, v5.32, v5.33a % N Reduction 2006-2010	NLEW v5.33b, v6.0 % N Reduction 2011-Current
20’	40% (grass)* 75% (trees and shrubs)*	30%	20%
30'	65%	40%	25%
50'	85%	50%	30%
70'	85%	55%	30%
100'	85%	60%	35%

**NLEW v5.02 - the vegetation type (i.e. trees, shrubs, grass) within 20' and 50' buffers determined reduction values. Based on research results, this distinction was dropped from subsequent NLEW versions.*

Current Status

Nitrogen Reduction from Baseline for CY2020

All seventeen LACs submitted their nineteenth annual reports to the BOC for approval in October 2021. For the entire basin, in CY2020 agriculture achieved a 48% reduction in nitrogen loss compared to the 1991-1995 baseline. This percentage is 2% lower than the reduction reported for CY2019. Table 2 lists each county's baseline, CY2019 and CY2020 nitrogen (lbs/yr) loss values, and nitrogen loss percent reductions from the baseline in CY2019 and CY2020.

*Table 2. Estimated Reductions in Agricultural Nitrogen Loss from Baseline (1991-1995) for CY2019 and CY2020, Neuse River Basin**

County	Baseline N Loss (lb)	CY2019 N Loss (lb)*	CY2019 N Reduction (%)	CY2020 N Loss (lb)*	CY2020 N Reduction (%)
Carteret	1,292,586	924,212	28%	966,672	25%
Craven	4,153,187	2,212,062	47%	1,980,469	52%
Durham	220,309	33,200	85%	36,470	83%
Franklin	219,209	32,658	85%	46,455	79%
Granville	193,197	35,648	82%	46,313	76%
Greene	4,439,036	2,163,599	51%	2,466,268	44%
Johnston	6,728,638	3,258,752	52%	3,489,180	48%
Jones	3,283,906	2,137,675	35%	1,785,255	46%
Lenoir	4,455,752	3,017,003	32%	2,909,603	35%
Nash	1,042,072	409,114	61%	395,104	62%
Orange	787,040	70,078	91%	85,586	89%
Pamlico	2,023,294	1,726,786	15%	1,800,264	11%
Person	616,669	53,223	91%	103,721	83%
Pitt	3,399,455	2,001,001	41%	1,982,978	42%
Wake	1,434,602	264,197	82%	310,103	78%
Wayne	8,297,408	3,142,220	62%	3,594,017	57%
Wilson	3,273,647	1,692,240	48%	1,744,588	47%
Total	45,860,007	22,957,806	50%	23,743,048	48%

** Nitrogen loss values are for comparative purposes. They represent nitrogen that was applied to agricultural lands in the basin and neither used by crops nor intercepted by BMPs in a Soil Management Unit, based on NLEW calculations. This is not an in-stream loading value.*

Nitrogen loss reductions were achieved through a combination of fertilization rate decreases, cropping shifts, BMP implementation, and cropland acreage fluctuation. Some of this cropping shift is due to the need for regular rotations on agricultural operations. In order to minimize the threat of disease the double-crop planting of wheat and soybeans is usually followed by a corn crop. This means that fluctuations within this rotation are to be expected from year to

year even in the face of similar weather conditions. Low cotton prices in the spring of 2020 resulted in a notable decrease in cotton acres from CY2019. Overall corn planting decreased by 5,435 acres from CY2019 totals, but corn acreage in CY2020 remained roughly 15,500 acres above corn acreage reported in CY2018. Overall soybean acres increased by roughly 23,000 acres from CY2019 totals. Wheat acres increased by almost 23,000 acres during CY2020 likely in part due to improved agricultural conditions from those in CY 2019. A mix of rain events and dry days in October 2019 gave farmers greater opportunity to harvest summer crops and plant winter crops including wheat[2]. Although 2020 was the second wettest year on record dating back to 1895, the winter of 2019/20 was abnormally dry with unseasonably warm conditions in February and March, enabling smoother harvest of winter crops and activating an earlier growing season[3]. Factors that influence agricultural nitrogen reductions are shown in Table 3.

Pamlico and Carteret Counties are working to improve their reduction, which decreased this year primarily due to a transition from crops with lower nitrogen input to crops with higher nitrogen input, as well as a methodological adjustment of cumulative BMP acres that initially changed with CY 2019 reporting (practices did not change - see "BMP Implementation" section). From CY2019 to CY2020, Pamlico experienced an increase of 678 acres of corn and a decrease of 397 acres of soybeans. From CY2018 to CY2020, Pamlico experienced an increase of 1,657 acres of corn and a decrease of 1,231 acres of soybeans and 1,186 acres of wheat. In CY2018, Pamlico nearly met the 30% reduction goal primarily due to reduction gains from BMP implementation and cropland shift from baseline values. Reduction gains from cropland loss have remained consistent over the last three crop years, while gains due to BMP implementation and cropland shift were cut in CY2019 and CY2020 for the reasons previously mentioned and further discussed in "BMP implementation." As of CY2018 it was estimated that over 40% of agricultural land in Pamlico County has some form of controlled drainage utilizing water control structures. The Pamlico Soil and Water Conservation District Board has included water control structure implementation and verification as a top priority in their FY2022 NC Agriculture Cost Share Program (ACSP) strategic plan so reduction gains for BMP implementation in the county can be reported with greater accuracy. Meanwhile, agriculture in the portion of Carteret County lying in the Neuse River Basin consists predominantly of Open Grounds Farm, where corn and soybean acreages remained consistent with those reported in CY2019, following regular cropping rotations. The DSWC, LACs and additional stakeholders are working with the agricultural community in Carteret and Pamlico counties to communicate the need for more BMP installation at existing commodity outreach events. The BOC will continue to focus its efforts to monitor these counties' progress and encourage BMP implementation.

The NLEW outputs and staff calculations estimate the factors that contributed to the nitrogen reduction by the percentages shown in Table 3.

[2] Davis, C. 2019. The Heat Backed Off and Rain Picked Up in October. Prepared by North Carolina State Climate Office for the Climate Blog, Climate Summary. https://climate.ncsu.edu/blog/2019/11/the-heat-backed-off-and-rain-picked-up-in-october/

[3] Davis, C. and K. Dello. 2021. An Extreme, Unusual 2020: the Weather Year in Review. Prepared by North Carolina State Climate Office for the Climate Blog, Climate Summary. https://climate.ncsu.edu/blog/2021/01/an-extreme-unusual-2020-the-weather-year-in-review/

*Table 3. Factors That Influence Nitrogen Reduction on Agricultural Lands (by percentage), Neuse River Basin Since Baseline**

Practice	CY2017	CY2018	CY2019	CY2020
BMP implementation	10%	9%	6%	5%
Fertilization management	13%	9%	13%	11%
Cropping shift	19%	19%	15%	15%
Cropland converted to grass/trees	2%	2%	2%	2%
Cropland lost to idle land	2%	6%	6%	7%
Cropland lost to development	8%	8%	8%	8%
Total	54%	53%	50%	48%

**Percentages are based on a total of the reduction from baseline, not a year-to-year comparison.*

BMP Implementation

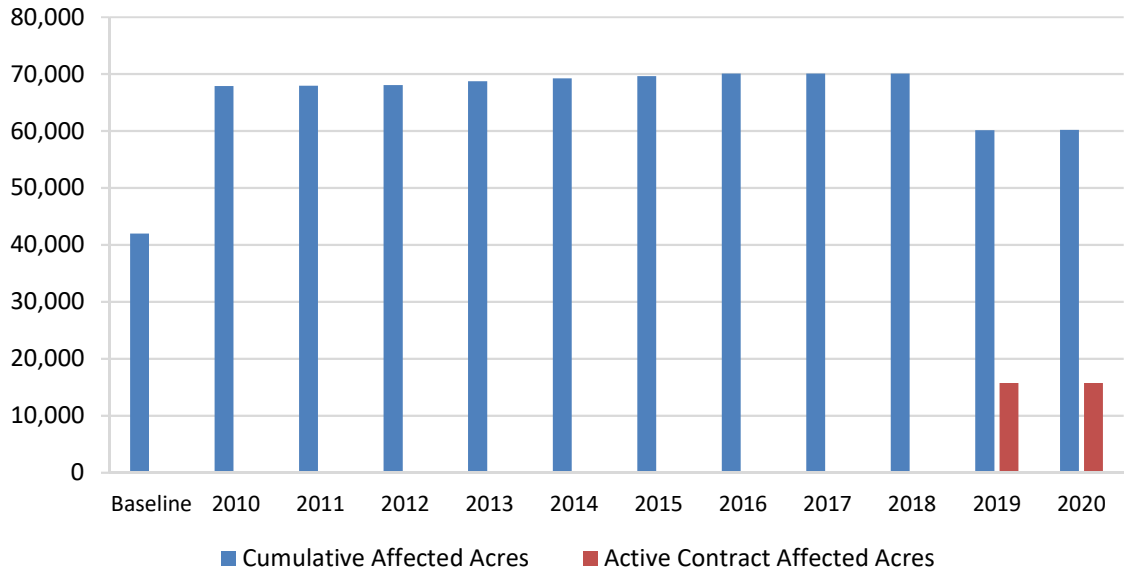
BMP implementation is one of the factors that influence nitrogen reduction on agricultural land. In low elevation coastal counties near and around the Neuse estuary the predominant BMPs being implemented by agricultural producers are water control structures. These practices are normally implemented to control salinity and soil moisture, but they have an additional benefit of allowing for increased denitrification. Since baseline, Craven and Pamlico Counties implemented controlled drainage affecting roughly 18,000 and 15,000 acres respectively. Many of these practices were implemented over a decade ago and are no longer under active cost-share contracts. Every effort is made to ensure that BMPs currently being reported continue to function as designed. Verification of this functionality requires site visits to individual farm owners who may or may not have this BMP under an active cost-share contract. Coastal counties have reported that despite contract expirations for practices installed more than 10 years ago, the water control structures which have been checked and which are no longer covered by an operation and maintenance agreement are still being actively managed by producers.

In this report, all acres affected by water control structures reported in CY2010 were manually removed from each county's total to ensure that all affected acres currently being reported are for active contracts only. This reporting change began in CY2019. Members of each LAC in coastal counties were notified in Fall 2019 that inactive contract acres, starting in CY2019 and moving forward, will not be included in BMP totals until each District either manually confirms that the older structures are still operational and being actively managed, or until the producer signs a new cost share contract. Operational structure confirmation will ensure that affected acres are not being reported for farms which are no longer in operation. Each producer who still farms and actively manages their operation's drainage is eligible for a repair contract to replace worn out materials, which restarts the 10-year operation and maintenance agreement requiring periodic spot checks to verify practice functionality and compliance with Soil and Water Conservation Commission policies. Contracts which are re-enrolled in the Agriculture Cost Share Program or structures which are field verified as still functioning were re-added to the cumulative acre total. Several Districts have indicated an interest and willingness in re-engaging some of these past cooperators.

The removal of inactive contract BMP acres from annual reports has resulted in a smaller nitrogen loss reduction mainly in coastal counties in CY2020. This includes significant changes in Carteret, Craven, Pamlico, Jones, Lenoir, Pitt, and Wayne counties. It is important to note that this abrupt reduction, first seen in the CY2019 report, is primarily based on a methodological change and not on farmer behavior or BMP functionality. The BOC still expects that most acres where controlled drainage practices were implemented are still actively being managed, but in order to ensure ongoing engagement with landowners the BOC has decided to adjust reporting guidelines. Due to ever-present landowner demand, increased prioritization and implementation of water control structure contracts is still evident in many of these counties, and the BOC expects this trend to continue into the future as precipitation patterns change.

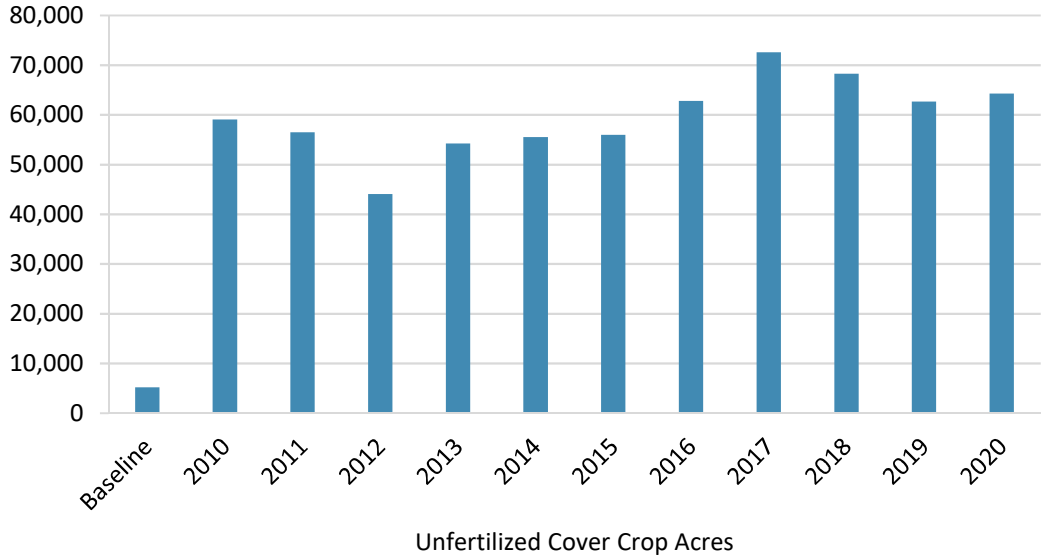
As previously mentioned, Carteret County's predominant agricultural producer in the portion of the county lying within the Neuse River Basin is Open Grounds Farm. This facility, which is owned by a foreign company, cultivates over 20,000 acres annually. Carteret Soil and Water Conservation District staff has confirmed with the Open Grounds farm manager that approximately 60% of their overall acres are under controlled drainage via water control structures. As a result, the total cumulative acres in this BMP category have been adjusted to 60% of their annual crop total, since all practices which were originally installed at Open Grounds Farm are being maintained for their original purpose. All other contracts in Carteret County were removed from the cumulative and active contract totals starting in CY2019 since most of those properties are no longer under active cultivation.

Figure 2. Acres Affected by Water Control Structures for Baseline (1991-1995) and Installed from CY2010 to CY2020, Neuse River Basin



The Division of Soil and Water Conservation, Soil and Water Conservation Districts and Natural Resources Conservation Service staff continue to make refinements to the NLEW accounting process as opportunities arise. LAC members estimate annual unfertilized cover crop acres based on crop rotations, producer cropping history, state and federal incentive programs, weather patterns, and seed prices. Buffer and water control structure BMP data is collected from state and federal cost share program active contracts, and in some cases (especially unfertilized cover crops) BMPs that were installed without cost share funding. While there is some opportunity for variability in the data reported, LACs are including data that is the best information currently available. As additional sound data sources become available, the LACs will review these sources and update their methodology for reporting if warranted. As illustrated in Figure 3, CY2020 BMP implementation yielded a net increase of 1,591 unfertilized cover crop acres.

Figure 3. Unfertilized Cover Crop Acres Planted Annually on Agricultural Lands for Baseline (1991-1995) and Installed from CY2010 through CY2020, Neuse River Basin



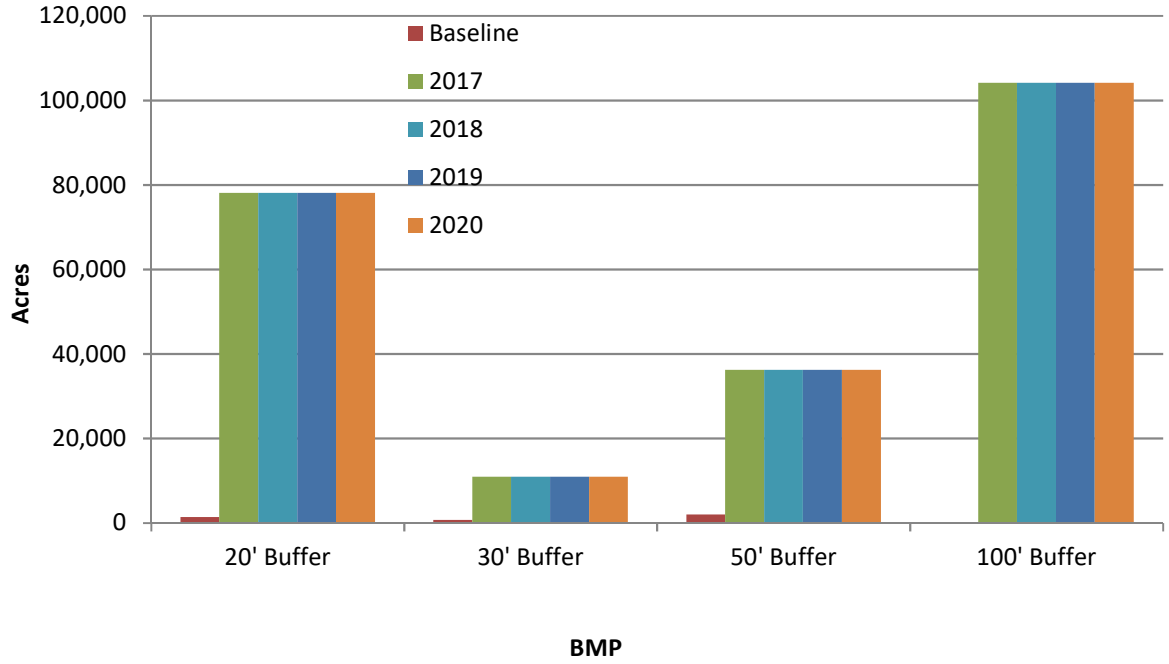
An accurate reassessment of active agricultural land and remaining buffer systems, through GIS analysis or other tools, is needed due to the rate at which urbanizing counties have lost agricultural land. Such assessments will depend on data availability from state and federal agencies. The BOC is considering the feasibility of such assessments for future reporting.

Based on the comparison of total cropland acres and state or federal cost share program BMPs, it is estimated that over a third of the Neuse River Basin's cropland receives treatment from reported nitrogen reducing BMPs.[4] This does not include farmer-installed BMPs that are not funded by cost share programs except in some cases where District staff is made aware of work that has been completed. Additionally, the estimated acres do not take into account the entire drainage area treated by buffers in the piedmont, which is generally 5 to 10 times higher than the actual acres of the buffer shown in Figure 4.[5] Overall, the total acres of implementation of BMPs have increased since the baseline, as illustrated in Figures 2, 3 and 4. The BMP installation goals were set by the local nitrogen reduction strategy, which was approved by the EMC in 1999. Agriculture exceeded all of these goals in CY2008. As shown in Figure 4, four additional acres of 20 foot buffers, six additional acres of 30 foot buffers, and two additional acres of 50 foot buffers were implemented in CY2020.

[4] Osmond, D.L., K. Neas. 2011. Delineating Agriculture in the Neuse River Basin. Prepared for NC Department of Environment and Natural Resources (NCDENR), Division of Water Quality. http://content.ces.ncsu.edu/delineating-agriculture-in-the-neuse-river-basin

[5] Bruton, Jeffrey Griffin. 2004. Headwater Catchments: Estimating Surface Drainage Extent Across North Carolina and Correlations Between Landuse, Near Stream, and Water Quality Indicators in the Piedmont Physiographic Region. Ph.D. Dissertation. Department of Forestry and Environmental Resources, North Carolina State University, Raleigh, NC 27606. http://www.lib.ncsu.edu/theses/available/etd-03282004-174056/

*Figure 4. Buffer Acres Present on Agricultural Lands for Baseline (1991) and Installed from CY2017 through CY2020, Neuse River Basin**



**The acres of buffers listed represent actual acres. Acres affected by the buffer could be 5 to 10 times larger in the piedmont than the acreage shown above.* [6]

Additional Nutrient BMPs

Not all types of nutrient-reducing BMPs are tracked by NLEW. These include livestock-related nitrogen and phosphorus reducing BMPs, BMPs that reduce soil and phosphorus loss, and BMPs that do not have enough scientific research to support a nitrogen reduction benefit. The BOC believes it is worthwhile to recognize these practices. Table 4 identifies BMPs not accounted for in NLEW and tracks their implementation in the basin since CY1996. Table 5 indicates the total number of BMPs not accounted for in NLEW, which are under active contract (implemented from CY2010 to CY2020).

Since baseline, increased implementation numbers are evident across most BMP types. In CY2020, most of the additional nutrient BMPs (which are listed in Tables 4 and 5) experienced implementation increases compared to BMP acreage in CY2019. Some of these BMPs will yield reductions in nitrogen loss that are not reflected in the NLEW accounting in this report but will benefit the estuary.

[6] Bruton, Headwater Catchments: Estimating Surface Drainage Extent Across North Carolina and Correlations Between Landuse, Near Stream, and Water Quality Indicators in the Piedmont Physiographic Region. Ph.D. Dissertation. Department of Forestry and Environmental Resources, North Carolina State University, Raleigh, NC 27606. http://www.lib.ncsu.edu/theses/available/etd-03282004-174056/

*Table 4. Nutrient-Reducing Best Management Practices Not Accounted for in NLEW, CY1996 to CY2020, Neuse River Basin**

BMP	Units	1996-2018	2019	2020
Diversion	Feet	180,717	183,017	185,317
Fencing (USDA programs)	Feet	234,827	239,587	239,587
Field Border	Acres	5,949	5,955	5,959
Grassed Waterway	Acres	2,501	2,517	2,531
Livestock Exclusion	Feet	149,501	151,648	153,795
Precision Agriculture	Acres	4,672	4,672	5,326
Sod Based Rotation	Acres	109,314	111,304	122,619
Tillage Management	Acres	61,384	62,478	63,634
Terraces	Feet	77,633	77,633	77,633

** Cumulative data quantified by adding BMPs implemented with State and Federal cost share program funding each Crop Year to cumulative totals reported the previous Crop Year. Additional BMPs may exist in the basin as practices may be installed by farmers without cost share assistance.*

*Table 5. Nutrient-Reducing Best Management Practices installed from CY2010 to CY2020, Not Accounted for in NLEW**

BMP	Units	BMPs Installed (CY2010 – CY2020)
Diversion	Feet	36,208
Fencing (USDA programs)	Feet	127,558
Field Border	Acres	2,659
Grassed Waterway	Acres	275
Livestock Exclusion	Feet	79,042
Precision Agriculture	Acres	5,326
Sod Based Rotation	Acres	73,488
Tillage Management	Acres	32,689
Terraces	Feet	27,663

** Values represent only active contracts in State and Federal cost share programs. Additional BMPs may exist in the basin as producers may maintain practices after the life of a cost share contract. Practices installed by producers without cost share assistance are not included in BMP totals.*

Fertilization Management

Better nutrient management in the Neuse River has resulted in a reduction of fertilizer application rates from baseline levels. Despite annual fluctuations, fertilization rates for all major crops in the basin have been reduced from the baseline period.

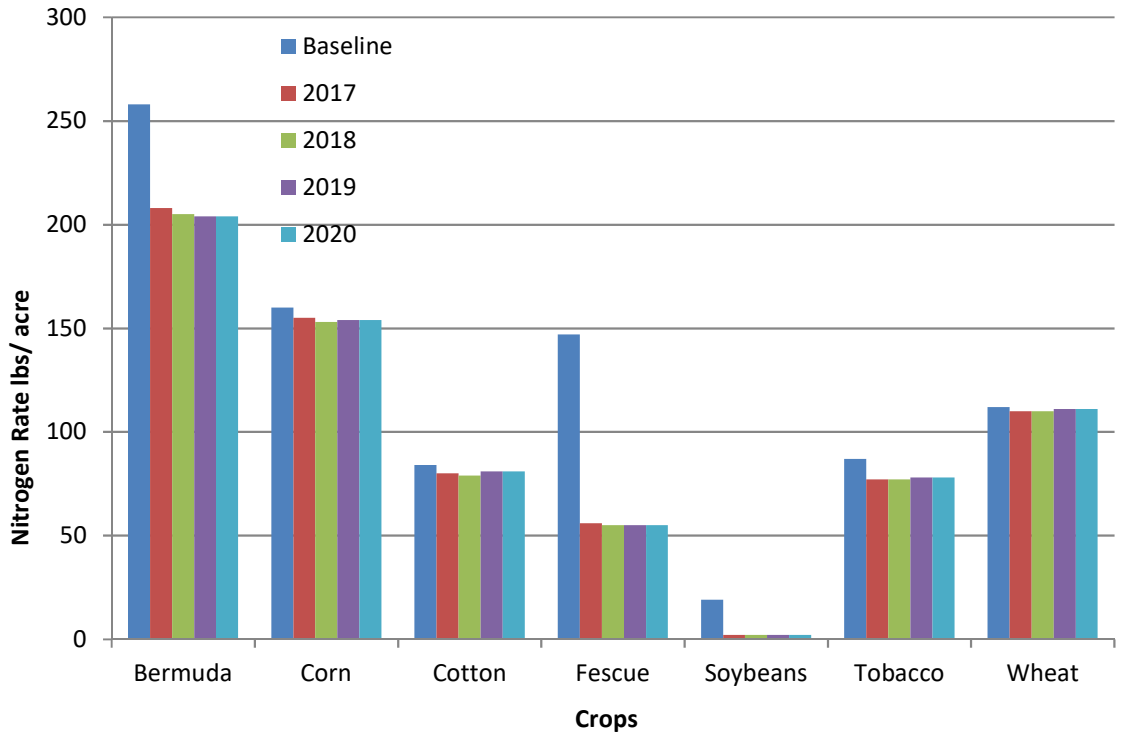
Between CY2019 and CY2020 nitrogen application rates remained relatively stable (less than 5 lbs/acre fluctuations) for fescue, cotton, corn, tobacco, soybeans, wheat, and bermuda. Figure 5 shows these application rates.

Factors Identified by LACs Contributing to Reduced Nitrogen Application Rates

- Economic decisions and fluctuating farm incomes.
- Increased education and outreach on nutrient management
- Mandatory animal waste management plans
- The federal government tobacco quota buy-out reducing tobacco acreage.
- Neuse and Tar-Pamlico Nutrient Strategies

Over time there has been an economic incentive for producers to improve nitrogen management. Fertilizer rates and standard application practices are revisited annually by LACs using data from farmers, commercial applicators and state and federal agencies' professional estimates.

Figure 5. Average Annual Nitrogen Fertilization Rate (lbs/ac) for Agricultural Crops for the baseline (1991-1995) and 2017-2020, Neuse River Basin

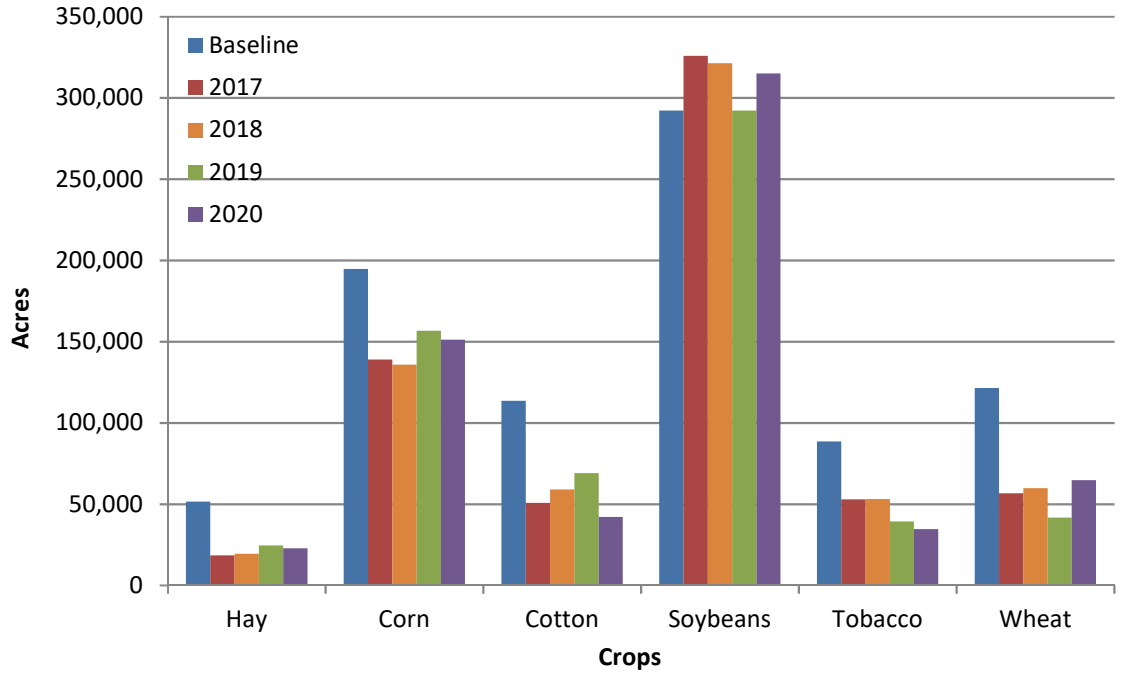


Cropping Shifts

The LACs recalculate the cropland acreage annually by utilizing crop data reported by farmers to the Farm Service Agency. Because each crop type requires different amounts of nitrogen and utilizes applied nitrogen with a different efficiency rate, changes in the mix of crops grown can have significant impact on the cumulative yearly nitrogen loss reduction. The BOC anticipates that the basin will see additional crop shifts in the upcoming year based on changing commodity prices and weather patterns.

Corn requires higher nitrogen application rates than other crops. From CY2019 to CY2020, corn acres decreased by 5,435 acres; however, CY2020 corn acreage was roughly 15,500 acres above reported corn acreage in CY2018. Cotton prices were low in CY2020 and cotton acreage consequently decreased by almost 27,000 acres from CY2019 to CY2020. Soybean acres, which require no nitrogen input, increased over 23,000 acres between CY2019 and CY2020; however soybean acreage remains approximately 6,250 acres below total soybean acreage reported in CY2018. Wheat acres, many of which are planted in a double-crop rotation with soybeans, increased by 22,963 acres, and tobacco acres decreased by almost 4,640 acres between CY2019 and CY2020; an 18,525-acre reduction from CY2018. These cropping shifts caused a slight increase in overall nitrogen loss. A host of factors from individual choice to global markets determine crop selection.

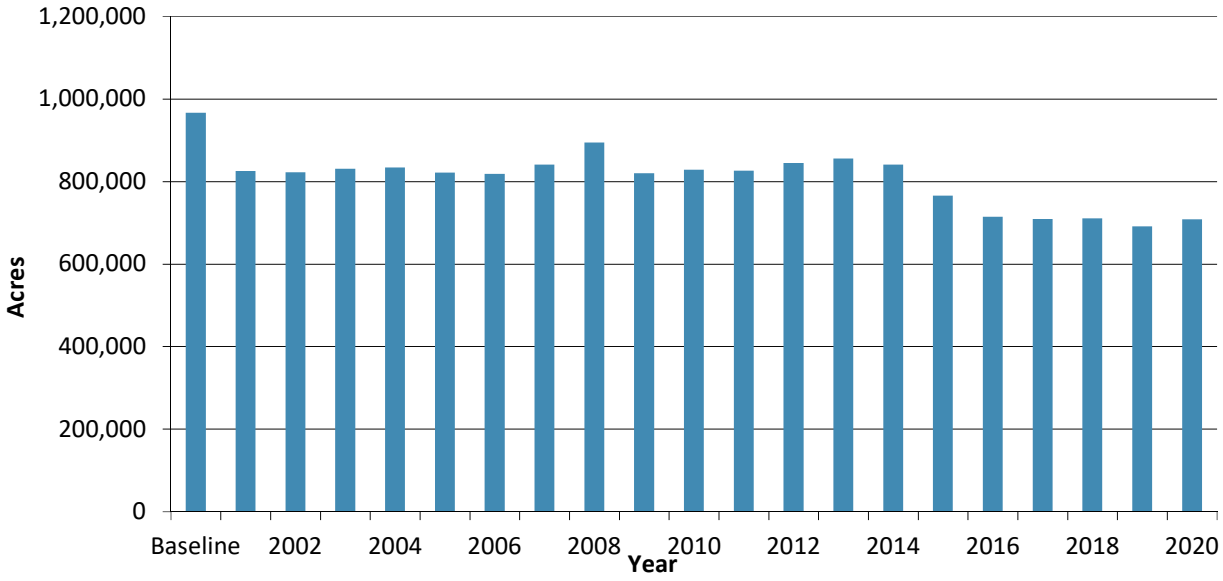
Figure 6. Acreage of Major Crops for the Baseline (1991-1995) and 2017-2020, Neuse River Basin



Land Use Change to Development, Idle Land and Cropland Conversion

The number of cropland acres fluctuates every year in the Neuse River Basin. Each year, some cropland is permanently lost to development or converted to grass or trees, while some cropland is temporarily taken out of production. Idle land represents agricultural land that is currently out of production but could be brought back into production at any time. Cropland conversion and cropland lost to development represents land taken out of agricultural production that is unlikely to be returned to production. Currently, it is estimated that more than 81,000 acres have been lost to development, and currently 23,386 acres have been converted to grass or trees since the baseline. For CY2020 there were 70,809 idle acres and a total of 708,113 NLEW-accountable crop acres. These estimates come from the LAC members' best professional judgment, USDA-FSA records and county planning departments. Cropland acres have continued to decrease from the baseline period, although CY2020 experienced an increase of 16,849 crop acres from CY2019 (see Figure 7).

Figure 7. Total NLEW Accounted Crop Acres in the Neuse River Basin, Baseline (1991-1995) and 2001-2020.



Looking Forward

The Neuse BOC will continue to report on rule implementation, relying heavily on Soil and Water Conservation District staff to compile crop reports. The BOC continues to encourage counties to implement additional BMPs to further reduce nitrogen loss.

Because cropping shifts are susceptible to various pressures, the BOC is working with LACs in all counties to continue BMP implementation that provides lasting reduction in nitrogen loss in the basin.

The Neuse BOC will continue to monitor and evaluate crop trends. The current shift to and from crops with higher nitrogen requirements may continue to influence the yearly reduction.

Basin Oversight Committee recognizes the dynamic nature of agricultural business.

- Changes in world economies, energy or trade policies.
- Changes in government programs (i.e., commodity support or environmental regulations)
- Weather and climate (i.e., long periods of drought or rain)
- Scientific advances in agronomics (i.e., production of new types of crops or improvements in crop performance)
- Plant disease or pest problems (i.e., viruses or foreign pests)
- Urban encroachment (i.e., crop selection shifts as fields become smaller)
- Age of farmer (i.e, as retirement approaches farmers may move from row crops to cattle)

Funding

Ongoing agriculture rule reporting has incorporated data processing efficiencies and improvements in recent years. NLEW upgrades have allowed LAC members to more actively participate in the compilation of data and analysis of nitrogen loss trends, and a new Division of Soil and Water Conservation contracting system has helped optimize BMP documentation efforts.

In CY2020, soil and water conservation districts spent over $879,000 through the Agriculture Cost Share Program in the Neuse River Basin using recurring state appropriated funds and non-recurring disaster relief funds for BMP implementation. The Natural Resources Conservation Service spent over $1,404,000 through the Environmental Quality Incentives Program in the counties of the Neuse River Basin. These programs have all helped fund erosion and nutrient reducing BMPs in the Neuse Basin.

The EPA 319(h) grant program, which is administered by the Department of Environmental Quality, has approximately $1 million in competitive grant funds available statewide for implementation of approved nonpoint source management programs. Grant funds from the 319(h) program can be used to supplement technical assistance, match cost share funding, and support BMP implementation. The Division of Soil and Water Conservation, funded through an EPA 319(h) grant, expends approximately $50,000 on agricultural reporting staff support annually.

Each year, 150 LAC members contribute to agriculture rule reporting to ensure accurate documentation of agricultural acres and fertilization rates. Farmers and agency staff with other

responsibilities serve on the LACs in a voluntary capacity. Basin Oversight Committee members meet at least once per year to review and approve this annual progress report, which includes time spent outside of that annual meeting to review draft documents and approve methodology changes. Participation by so many members of the local agricultural community demonstrates a commitment toward achieving the nutrient strategy's long-term goals.

With less funding available for reporting support at the state level, responsibility for compilation of annual local progress reports falls on these LACs and Soil and Water Conservation District staff. Few currently serving LAC members were active during the stakeholder process for the Agriculture Rule, so some institutional knowledge about annual reporting requirements has been lost. As a result, training of new Soil and Water Conservation District staff and LAC members regarding rule requirements and reporting is ongoing.

Funding is an integral part in the success of reaching and maintaining the goal through technical assistance and BMP implementation. It is also important for data collection and reporting.

In the early years of Neuse Agriculture Rule reporting, grant funding supported technicians and basin coordinators at Soil and Water Conservation Districts to assist with reporting requirements. At the present time there is no funding for full-time Neuse basin coordinators or technicians. Consequently, in addition to other duties, the NCDA&CS Division of Soil and Water Conservation Nonpoint Source Planning Coordinator was assigned the data collection, compilation and reporting duties for the Neuse Agriculture Rule and for all other basins and watersheds subject to existing Nutrient Sensitive Waters Strategies and Agriculture Rules.

With funding and staff reductions, a more centralized approach to data collection and verification is necessary. This evolving approach may involve developing additional GIS analysis tools and streamlining FSA acreage documentation. New tools will be vetted by the BOC and may be incorporated into the agriculture rule accounting methodology. As methods change, LACs will be trained to handle the changing workloads to the best of their ability. Because most district staff have neither the time nor financial resources to synthesize county level data, centralized collection approaches will come at the expense of local knowledge. Annual agricultural reporting is required by the rules; therefore, continued funding for the Division's only remaining nutrient coordinator position is essential for compliance.

Previously, funding was available for research on conservation practice effectiveness, realistic yields, and nitrogen use efficiencies. Due to eligibility changes and other funding constraints, it is unlikely that new data will be developed. Prior funding sources for such research, which provided much of the scientific information on which NLEW was based, are no longer available. Should new funding be made available, additional North Carolina-specific research information should be incorporated into future NLEW updates.

Conclusion

Significant progress has been made in agricultural nitrogen loss reduction, and the agricultural community consistently reaches its 30% reduction goal. However, the measurable effects of management changes and conservation practice implementation on overall in-stream nitrogen reduction may take years to develop due to the nature of non-point source pollution. Nitrogen reduction values presented in this annual summary of agricultural reductions reflect “edge-of-management unit” calculations that contribute to achieving the overall 30% nitrogen loss reduction goal. Significant quantities of agricultural BMPs have been installed since the adoption and implementation of the nutrient management strategy, and agriculture continues to fulfill its obligations toward achieving the collective goal of a 30% reduction of nitrogen delivered to the Neuse estuary.